decline in evaporation each year in plants whose water supply is not replenished is attributed in part to increasing concentration of the cell sap; in the cacti this increase was from 1 to 3 per cent. From 60 to 70 per cent of the maximum water-balance may be lost by cacti without impairing the power of recovery and subsequent growth. It is suggested that a detailed chemical study of these plants is needed, it being felt that their high osmotic activity and their great acidity resulting from modified photosynthesis are insufficient to explain the origination of the habit of accumulating and retaining large water-balances.—H. C. COWLES.

English woodlands.—As would be expected, very few of the English woodlands are primeval. Such woodlands may still be found, however, near the upper forest limits in mountainous regions.[9] Most English woodlands are to be regarded as semi-natural, that is, the trees are felled somewhat regularly, but the reproduction, either from seeds or suckers, is natural. New forest plantations are distinguishable from natural or semi-natural woodlands by the presence at times of exotic tree species, and almost always by the absence of a representative woodland ground flora. Three main series of woodlands are recognized, the alder-willow series of wet soils, the oak-birch series of siliceous soils, and the beech-ash series of calcareous soils. The series are further divided into associations.

ADAMSON has made an intensive study of Gamlingay Wood in western Cambridgeshire, one of the semi-natural woodlands noted above.[10] The wood is on bowlder clay, part of which is calcareous and part non-calcareous; the trees on the former are oak and ash, while the ash is absent on the latter. Although it is noted that there are intergradations, it is observed that the herbage in the two woodland types is different; the dominant forms in the siliceous woodland are *Pteris aquilina* and *Holcus mollis*, whereas those of the calcareous woodland are *Spiraea Ulmaria*, *Mercurialis perennis*, *Deschampsia caespitosa*, and *Fragaria vesca*. Little attention is paid to successional features. It is believed by the reviewer that more thorough successional studies would tend to break down some of the distinction between calcareous and siliceous woodlands, as recognized by English ecologists; it seems almost certain that an original underlying soil must more and more lose its influence on vegetation, as humus accumulates. Careful studies were made by ADAMSON of evaporation, soil moisture, and other factors.

In connection with the above it may be noted that TANSLEY and ADAMSON[11] have given an account of some observations made in some Gloucestershire

[9] MOSS, C. E., RANKIN, W. M., and TANSLEY, A. G., The woodlands of England. New Phytol. **9**:113–149. 1910.

[10] ADAMSON, R. S., An ecological study of a Cambridgeshire woodland. Jour. Linn. Soc. Bot. **40**:339–387. *pls. 6*. 1912.

[11] TANSLEY, A. G., and ADAMSON, R. S., Reconnaissance in the Cotteswolds and the Forest of Dean. Jour. Ecol. **1**:81–89. 1913.

woodlands. One of the most interesting features is a wood composed largely of box (*Buxus sempervirens*), possibly native to Britain.—H. C. COWLES.

Jurassic Osmundaceae.—SINNOTT[12] has investigated the structure of petrified stems of *Osmundites Dunlopi* from the Jurassic of New Zealand. They are characterized by a parenchymatous pith, with no internal phloem or endodermis, and leaf gaps are invariably present. In one specimen typical diarch roots, with a definite cortex, were observed in the pith, and it is concluded that the xylem elements described as forming part of a "mixed pith" in *O. Kolbei* probably represent root bundles. It is thought that the relationship between Zygopterideae and Osmundaceae cannot be close, since the anatomy of the leaf trace and foliar bundle in the two groups is so widely different. It seems evident that there were both protostelic and siphonostelic Osmundaceae during the Mesozoic, and there is no evidence that the protostelic forms have given rise to the siphonostelic ones.—J. M. C.

Welwitschia.—CHURCH[13] has made a detailed study of the strobili of *Welwitschia*, supplying facts and new illustrations that were much needed. The "flowers" having clearly been originally bisporangiate, much attention is given to reduction phenomena, such as dicliny, the diminished number of members, etc. A good deal is made of "minimum construction" associated with a xerophytic type, observed in the perianth, the androecium, and gynoecium; but the statement is emphasized that "a minimum construction does not imply any phylogenetic relationship to other minimum types." The author finds no indication of any relation to the flowers of angiosperms.—J. M. C.

Relationships of Fagaceae.—Miss BERRIDGE[14] has investigated the flowers of certain Fagaceae, especially those of *Castanopsis chrysophylla*, comparing them with those of *Castanea vulgaris*, *Fagus sylvatica*, *Quercus Robur*, and *Juglans regia*. She takes issue with the common conclusion that the Amentiferae are an isolated group, with no obvious relationship to other angiosperms. She shows that the flower differs in no essential from other epigynous types of flowers, and compares in detail the flowers of Rosaceae and Cupuliferae, claiming that in all probability the epigynous Rosaceae are most nearly related to the ancestors of the Fagaceae.—J. M. C.

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[12] SINNOTT, E. W., Some Jurassic Osmundaceae from New Zealand. Ann. Botany **28**:471–479. *pl. 37*. 1914.

[13] CHURCH, A. H., On the floral mechanism of *Welwitschia mirabilis* (Hooker). Phil. Trans. Roy. Soc. London B **205**:115–151. *pls. 9–13*. 1914.

[14] BERRIDGE, E. M., The structure of the flower of Fagaceae, and its bearing on the affinities of the group. Ann. Botany **28**:509–526. *figs. 9*. 1914.